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Spadicoides matsushimae sp. nov., and *Anisospadicoides* gen. nov. for two atypical *Spadicoides* species

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Abstract—*Anisospadicoides* is proposed as a new genus for two species of *Spadicoides*, *S. macrocontinua* and *S. macroobovata*, that have polytretic and blastic conidial ontogeny on the apical conidiogenous cells. A new species, *Spadicoides matsushimae*, distinguished by broadly fusiform to navicular, mostly 2-septate, brown to dark brown conidia, is also described and illustrated.

Key words—asexual *Ascomycota*, *Helminthosphaeriaceae*, hyphomycetes, systematics

Introduction

Spadicoides S. Hughes, typified by *S. bina* (Corda) S. Hughes, is distinguished by macronematous, mononematous, and generally unbranched erect conidiophores. Conidiogenous cells are polytretic, integrated, terminal and intercalary, determinate, with conidiogenous loci

at the apex and laterally below. The conidia are solitary, variously shaped (ellipsoidal, oblong, obovoid, obclavate, globose, clavate, or cuneate), unicellular or multicellular, euseptate, smooth or verruculose, subhyaline to brown or black, and dry (Ellis 1971, Hughes 1958, Ma & al. 2016, Xia & al. 2013, Whitton & al. 2012).

Two *Spadicoides* species, *S. macrocontinua* and *S. macroobovata*, have an unusual combination of tretic and holoblastic conidial development on the apical conidiogenous cells (Matsushima 1993, 1995). Conidial ontogeny and conidiogenous events have been considered the fundamental criteria for asexual fungal taxonomy and generic delimitation (Kendrick 2017, Seifert & al. 2011). Consequently, we propose the new genus *Anisospadicoides* to accommodate two atypical *Spadicoides* species.

In 1993, Matsushima published a description and illustrations of a conspicuous fungus found on rotten petiole of a palm, but he did not provide a species epithet for it, merely calling it "*Spadicoides* sp." This fungus is formally named here as a new species, *S. matsushimae*.

Taxonomy

Anisospadicoides R.F. Castañeda, Qiao & Z.F. Yu, **gen. nov.** Fig. 1

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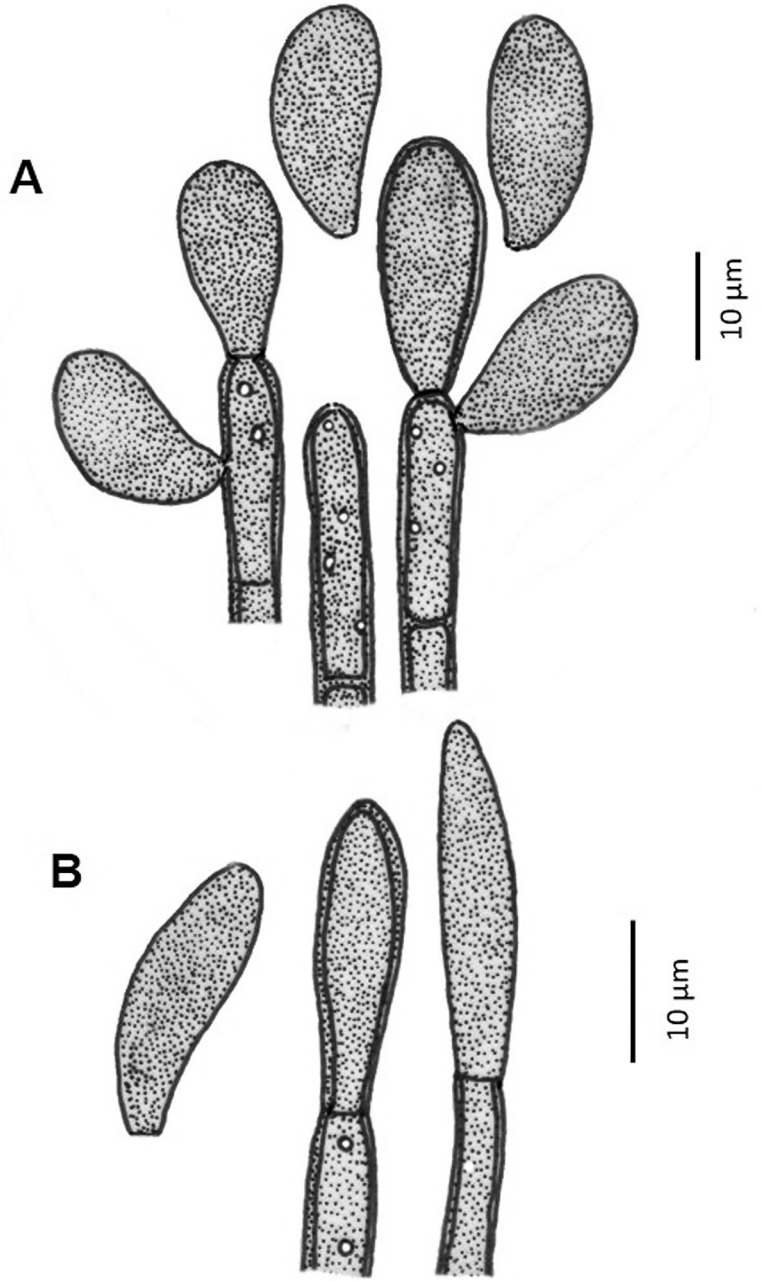
Differs from *Spadicoides* species by its holoblastic, mostly monoblastic conidial ontogeny, and production of conidia on the apical conidiogenous cells beside or near the tretic loci.

Type species: *Spadicoides macrocontinua* Matsush. [≡ *Anisospadicoides macrocontinua* (Matsush.) R.F. Castañeda & al.]

Etymology: Greek, *aniso-* meaning unequal, uneven, or dissimilar + Latin, *-spadicoides*, referring to the genus *Spadicoides*.

Colonies on CMA medium felted or hairy, brown to dark brown. Conidiophores macronematous, mononematous, unbranched, erect, straight, cylindrical, septate, smooth, brown to dark brown. Conidiogenous cells biontogenous, sometimes on the same cell: i) polytretic, integrated, mostly intercalary, cylindrical, sometimes terminal with subapical tretic loci and apical blastic loci; ii) monoblastic, integrated, terminal, sometimes with several tretic loci near below the blastic locus on the same cell.

Fig. 1. *Anisospadicoides macrocontinua* (holotype, MFC OP-302): A. Conidiogenous cells with apical conidia originated by holoblastic mode and subapical conidia borne from tretic loci; B. Conidiogenous cells with apical conidia originated by holoblastic mode and subapical tretic loci.


A
10 µm
B
10 µm

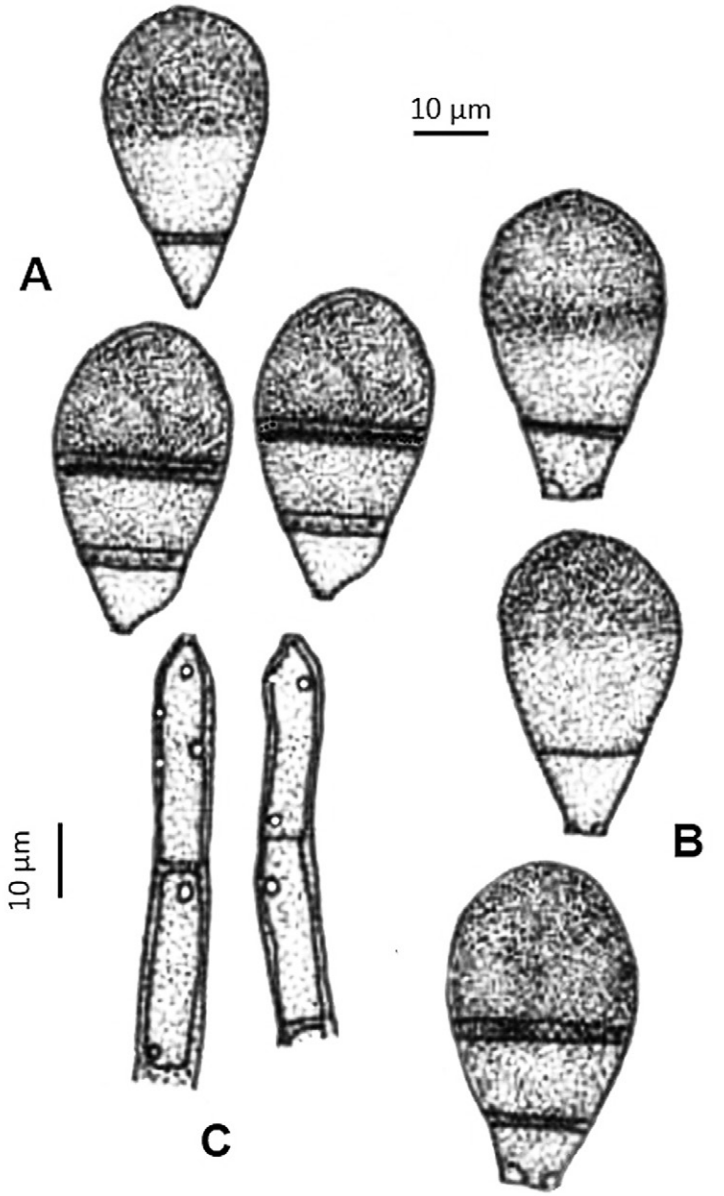


Fig. 2. *Anisospadicoides macroobovata* (holotype, MFC 4P-562): A. Conidia produced after holoblastic mode on the apical loci; B. Conidia produced after enteroblastic mode on the subapical and intercalary loci; C. Conidiogenous cells with apical blastic loci and subapical and intercalary tretic loci.

Conidia solitary, dimorphic: i) obovoid, subpyriform, truncate at the base, acropleurogenous, mostly pleurogenous, unicellular or septate, smooth, brown to dark brown or black, dry, borne on tretic conidiogenous loci; ii) obovoid, broadly subfusiform, to subclavate, attenuate or slightly fimbriate towards the truncate base, acrogenous, unicellular or septate, euseptate, smooth, brown to dark brown or black, dry, borne on blastic conidiogenous loci.

Anisospadicoides macrocontinua (Matsush.) R.F. Castañeda, Qiao & Z.F. Yu, **comb. nov.** Fig. 1

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≡ *Spadicoides macrocontinua* Matsush., Matsush. Mycol. Mem.7: 67 (1993).

Anisospadicoides macroobovata (Matsush.) Qiao, Z.F. Yu & R.F. Castañeda, **comb. nov.** Fig. 2

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≡ *Spadicoides macroobovata* Matsush., Matsush. Mycol. Mem. 8: 36 (1995).

Spadicoides matsushimae R.F. Castañeda & D.W. Li, **sp. nov.** Fig. 3

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Differs from *Spadicoides curvularioides* by its broadly fusiform, smaller, 2-septate, brown conidia.

Type: Peru, Rio Sinchicuy, 14°36′N 90°38′W, on decaying petiole of an unidentified palm, June 1991, coll. T. Matsushima (**Holotype**, MFC 1P-294).

Etymology: Latin, *matsushimae*, in reference to Takashi Matsushima, collector of the holotype specimen.

Conidiophores on the natural substratum macronematous, mononematous, unbranched, erect, straight, rigid, septate, brown, smooth, 50–160 µm long, 4.5–6 µm wide at the base, Conidiogenous cells polytretic, integrated, terminal and intercalary, determinate, brown. Conidia solitary, acropleurogenous, broadly fusiform to broadly navicular, conical-truncate at the base, rounded at the apex, (1–) 2-septate, smooth, 15–19 × 7–9 µm, with central cell brown to dark brown and larger than pale brown end cells.

Notes: There are 58 previously described species of *Spadicoides* (Index Fungorum 2018), of which only 42 were accepted by Goh & Hyde (1996), Kuthubutheen & Nawawi (1991), Ma & al. (2014, 2016), Whitton & al. (2012), and Xia & al. (2013). Ma & al. (2016) provided a comparative table of *Spadicoides* spp. and a key for their identification. Among the recognized *Spadicoides* species, only *S. curvularioides* B. Sutton & Hodges is superficially similar to *S. matsushimae* in producing more or less fusiform or navicular

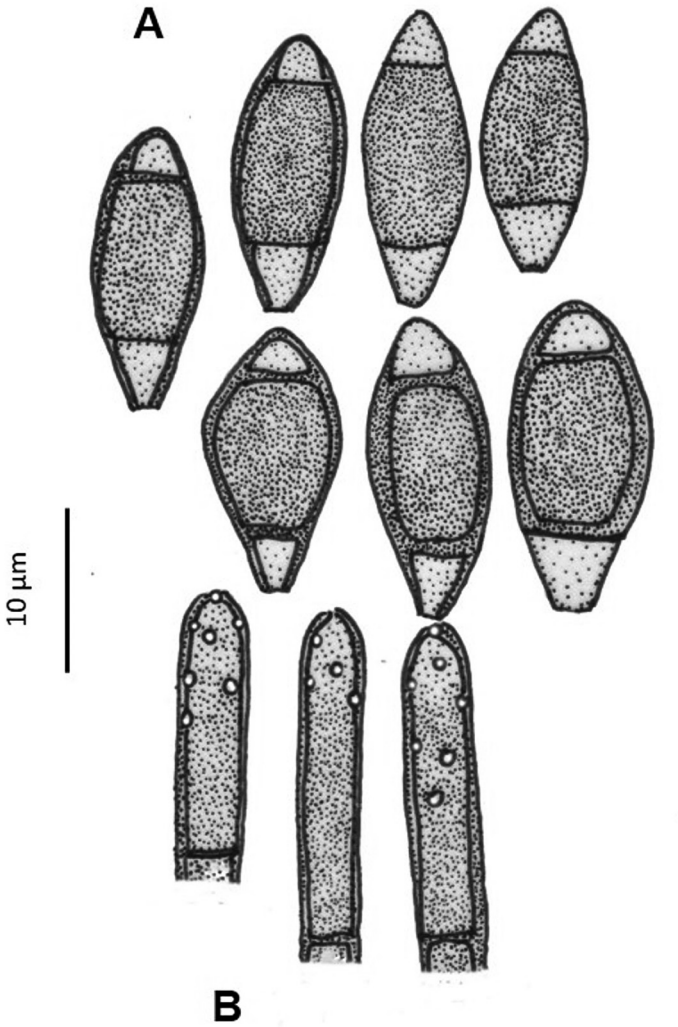

Fig. 3. *Spadicoides matsushimae* (holotype, MFC 1P-294):
A. Conidia; B. Conidiogenous cells and conidiogenous loci.

conidia, but *S. curvularioides* has pale brown conidia that are paler at the ends, 3-septate, longer (22–33.5 µm), and verruculose (Sutton & Hodges 1978).

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